

Research Reports

Breeding/Genetics

An Induced Twin-Podded Mutant from a Wilt-Resistant Annigeri Chickpea Cultivar

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A twin-podded chickpea plant was identified from the colchicine-induced tetraploid progenies of cv Annigeri that had single pods. The new genotype had two pods per leaf axil, which is similar to the double-podded types referred to in the chickpea literature. The new genotype was first observed in 1982/83 at ICRISAT Center in tetraploid progenies (C_4) developed from chickpea cultivar Annigeri. Annigeri is an established cultivar with single pods and yellow-brown, angular seeds. It is a fairly uniform population with good yield performance and was released for commercial cultivation in Karnataka state of India in 1940.

Studies in subsequent generations showed that the twin-podded characteristic was true-breeding. In the individual plants, though the majority of the bud axils produced twin flowers, only about 50% of the axils produced twin pods; the rest had either single or no pods. This may be due to bud or flower dropping, which is known to occur in about 55% of chickpea flowers (Pundir et al. 1983).

Colchicine is generally used to arrest spindle formation during cell division, so as to double the number of chromosomes in the growing tissues. Colchiploid chickpea plants are less fertile and produce less seed yield than the parent genotype. In subsequent generations, some plants can revert to diploids (Pundir et al. 1983), and fertility is restored to the level of the original parent. The present mutant is probably the result of a similar phenomenon, coupled with a gene mutation for the twin-podded characteristic.

About 100 twin-podded chickpea germplasm accessions were screened against wilt (*Fusarium oxysporum* f. sp. *ciceri* Pad.) at ICRISAT Center; none was found resistant. However, it was possible through hybridization to breed twin-podded plants with wilt resistance (Kumar and Haware 1983), indicating that although the two characteristics are probably very closely linked, the desired recombinants can be produced. The parent cultivar Annigeri is wilt-resistant and its twin-podded mutant also showed a similar level of resistance (Table 1). The twin-podded characteristic is possibly a positive yield component (Sheldrake et al. 1978), and resistance to wilt is an important trait for yield stability. Considering these facts, the present mutant is a valuable addition to the chickpea genetic resources, available for utilization in chickpea breeding.

Table 1. Some traits of chickpea mutant genotype Annigeri-TP and its parent cv Annigeri, recorded at ICRISAT Center during 1985/86.

Trait	Annigeri	Annigeri-TP
Plant height (cm)	30.7 ± 0.31	31.1 ± 1.47
Days to maturity	45.6 ± 1.35	44.3 ± 1.35
Pods plant ⁻¹	39.2 ± 21.87	48.6 ± 24.95
Seeds pod ⁻¹	1.4 ± 0.1	1.3 ± 0.20
100-seed mass (g)	19.8 ± 0.32	16.4 ± 0.36
Pods axil ⁻¹	1	1 or 2
Seed shape	Angular	Angular
Reaction to fusarium wilt	Resistant	Resistant

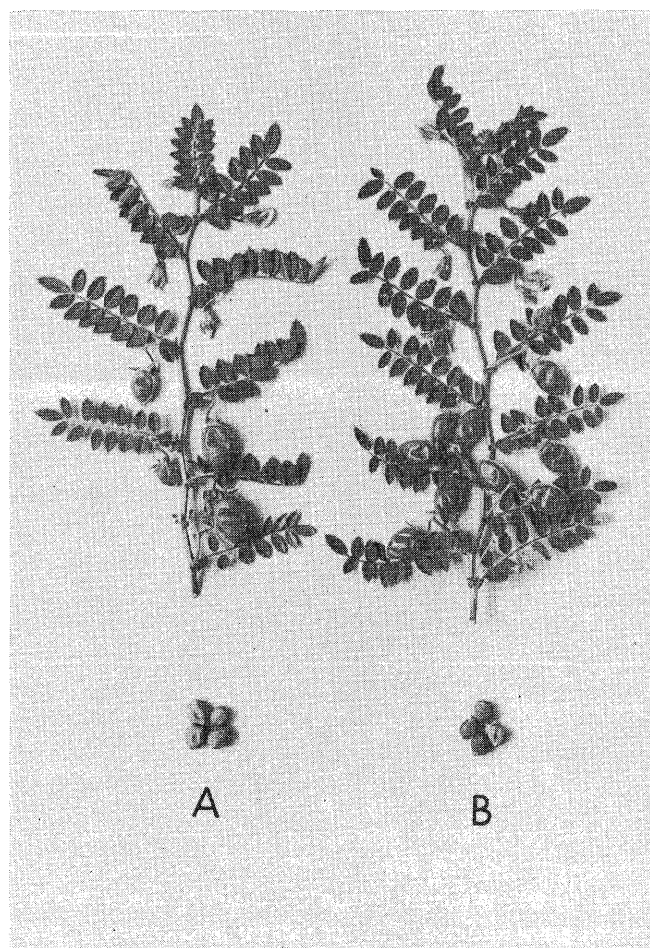


Figure 1. Branches of chickpea cultivars A. Annigeri; B. Annigeri twin-podded (TP) mutant.

The mutant genotype is similar to its parent cv Annigeri in seed shape, maturity time, growth habit, wilt resistance, and productivity. But it differs with respect to the twin-podded characteristic and has smaller seeds (Fig. 1). The mutant genotype has been designated "Annigeri-TP" and is being maintained in the ICRISAT genebank as ICC 14362. Seeds of this mutant can be obtained for research use from the Genetic Resources Unit of ICRISAT.

References

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Gora Hisari—A Promising Strain of Kabuli Chickpea

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Haryana is a major chickpea-producing state of India, contributing about 18% to the total chickpea production of the country. It grows mainly the desi type of chickpea, which is sown generally in the middle of October in fields with poor soil and uncertain irrigation. Kabuli chickpea, though much in demand for table purposes, is not grown extensively because of its poor yield and relatively high water requirement.

Gora Hisari was developed from a cross between two kabuli lines: L 144, a variety recommended for Haryana, and a genotype P 6613. It is of medium height, with a good number of fruiting branches, and a semi-spreading habit (Fig. 1) that is advantageous in situations where the plant stand is not uniform. The seed size is medium-large, nearly double that of commonly grown desi chickpea varieties (Fig. 2), and although smaller than seed of L 144, it has a good swelling capacity. The dried pods and foliage have a pinkish

hue. Table 1 shows the morphological characters and yield components of this strain.

In field performance tests Gora Hisari has proved superior to L 144 (Table 2). It requires less water than kabuli types and can be grown under conditions similar to those where desi types are grown. One irrigation during January is advantageous, though good yields have been obtained in Hisar from nonirrigated crops as well. The normal sowing period is the last week of November but sowing can be delayed till the first week of December. Thus, this strain can be grown after the harvest of cotton. Besides its good yield potential, Gora Hisari also has seed with a higher crude protein content (24.4%) and lower crude fiber content (2.2%) than L 550 (21.9 and 3.3%) and desi types.

Table 1. Morphological characters and yield components of kabuli chickpea strain Gora Hisari.

Number of fruiting branches plant ⁻¹	8
Number of pods plant ⁻¹	40-45
Number of seeds pod ⁻¹	1.26
1000-seed mass (g)	260
Seed yield plant ⁻¹ (g)	19
Average seed yield (kg ha ⁻¹)	2300-2500

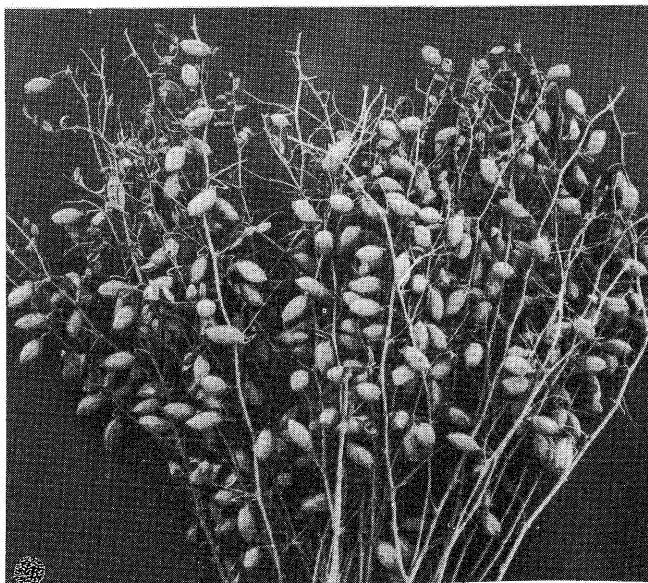


Figure 1. A plant of a new kabuli chickpea strain, Gora Hisari, showing profuse branching and heavy podding.